

WHAT IS CLAIMED IS:

1. A method for enhancing the response of bacteria to organic molecules, said bacteria having a regulatory protein with discrete functional domains for independent activities, one such domain being a sensor domain that detects said organic molecules through a direct physical interaction forming a protein-molecule
5 complex which binds to a cognate promoter sequence and activates expression of genes encoding metabolic enzymes, said method comprising modifying the sensor domain of the regulatory protein such that the response to the organic molecule is enhanced without altering the other domains.
2. The method as described in claim 1, wherein the bacteria are selected from the group consisting of *Pseudomonas* and *Acinetobacter* bacteria.
3. The method as described in claim 1, wherein the regulatory protein is selected from the group consisting of DmpR, MopR, PhhR, PhIR, XylR, and TbuT.
4. The method as described in claim 1, wherein the step of modifying the sensor domain of the regulatory protein is achieved by mutating the sensor domain thereof.
5. The method as described in claim 4, wherein said step of mutating the sensor domain comprises the steps of removing the sensor domain from the bacterial DNA encoding the regulatory protein, subjecting the removed sensor domain to mutagenic polymerase chain reaction, ligating the mutated sensor domain into the DNA
5 encoding the regulatory protein, and testing the bacteria for enhanced response to said organic molecules.
6. The method as described in claim 4, wherein said step of mutating the sensor domain comprises the steps of removing the sensor domain from the bacterial DNA encoding the regulatory protein, subjecting the removed sensor domain to gene reshuffling, ligating the mutated sensor domain into the DNA encoding the regulatory
5 protein, and testing the bacteria for enhanced response to said organic molecules.
7. The method as described in claim 1, wherein said organic molecules are selected from the group consisting of phenols and substituted phenols.